Title:	Testbeds for test Readiness: Strategic Snapshot
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Testbeds for Test Readiness

Strategic Snapshot

Capability Area

LA-UR#

GAPS/NEEDS

- Test bed engineering, monitoring for underground explosive and nuclear testing will be needed if the United States returns to a test posture of nuclear device testing.
- To maintain and rebuild the capability of test readiness, agile cost-effective test beds are needed and LANL as well as NNSS are the perfect locations to do this.
- Shallow and deep boreholes should be created to research containment science, diagnostic placement and optimization, coupling and emplacement science, tracer use for fracture and cratering research, and validation of test article performance.

TARGETS OF OPPORTUNITY

- Shallow test beds at LANL and NNSS can provide agile, cost-effective environments for test article validation.
- LANL leader in test bed science and positioned at NNSS as designer & review panel for U1a and sub-crit sciences.
- LANL and LLNL are the only remaining experts for containment science and the go-to labs for design and review of all subcrit and nuclear tests at NNSS.
- End result is to have initially 1-3 shallow boreholes at LANL and a suite of shallow boreholes at NNSS ready to test a large range of test articles.

ACTIONS TO PURSUE TARGETS

- Draft shallow borehole design, drilling, and diagnostic placement for a variety of test articles (materials, geometries) for deployment.
- Create briefing materials for weapons program managers.
- Share concept and design specifications with key program offices Don Haynes (U1a leader and NA10), Nina Rosenberg (NA22, NA243) as well as LDRD to launch the concept into prototype.

BENEFITS

- Shallow test beds can increase test article validation by order of magnitude.
- Cost-effective agile bore-holes drilled in a variety of environments can test performance over a range of geologic matrices.
- LANL boreholes can provide rapid tests of articles ranging in material types and geometries
- Repeat tests provide higher fidelity physics calculations of performance
- Next generation diagnostics can be tested over a range of geometries within the borehole
- Scaling, coupling, containment research can be performed in shallow vs. deep boreholes.
- Developing a test bed will provide important signature science data for Global Security application. Current proliferants may be testing at low yields and developing nearly identical test beds..

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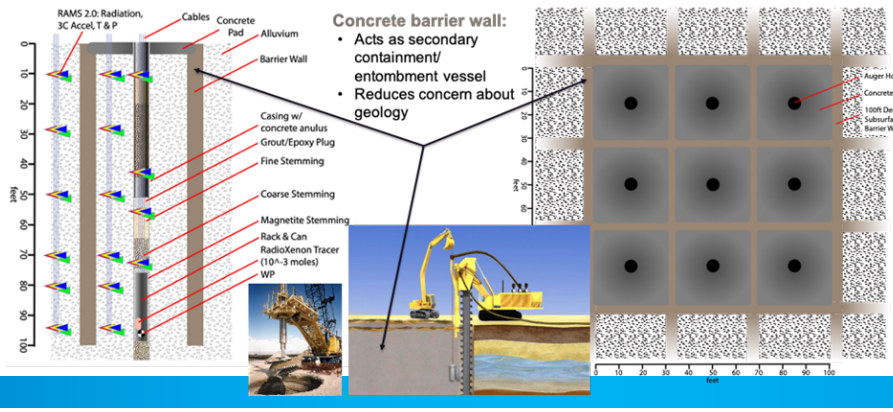

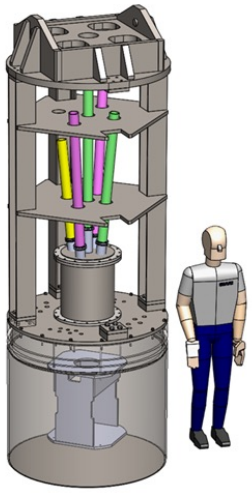

WHY WE ARE BUILDING Test Beds

To prepare for a United States testing environment, well characterized, instrumented, underground sites are needed to validate test article performance. Nevada National Security Site (NNSS) has served as the underground test bed for historic testing, but due to limited borehole availability, we are exploring shallow test bed capabilities both at NNSS and LANL to facilitate performance validation tests on hydrodynamic articles. These shallow test beds would provide cheaper readily available locations for diagnostics testing and surrogate test article performance testing (accommodating varieties of materials and quantities tested).

WHAT'S BEHIND OUR TECHNOLOGY

Current experiments containing SNM are restricted to the NNSS, almost exclusively at the U1a complex. This limits the cadence of experiments as this resource is overwhelmed with both LANL and LLNL users. Costs are high, formality of operations are extensive, and experiments are selected rigorously because of the demand on this HazCat 2 nuclear facility. As a result, a more agile, lower cost option is needed by the testing community to extend the testing experiments.

OUR COMPETITIVE ADVANTAGES

For 70 years, EES Division has served as the stewards and leaders in underground site preparation, characterization, and optimized testing for the article tests. Experts in containment, geophysics, tracer monitoring, ground coupling, cratering, ground shock, and fireball fallout use their knowledge to verify design performance and to monitor the Comprehensive Test Ban Treaty. EES has optimized article tests over 100's or boreholes across Nevada and has the expertise to design and engineer both deep and shallow borehole optimized tests. EES's extensive knowledge of geologic systems, fracture networks, seismic network data archives and current collections, infrasound expertise, optimized detector deployment, geology models and years of experience testing in Nevada, give LANL a competitive advantage in designing and engineering test beds.

OUR TECHNOLOGY STATUS

We have expertise in building and monitoring test beds over a variety of applications. Specifically geological hazards, U1a, P Tunnel, SPE1-3, Vulcan, and UNESE are all recent examples of how EES has perfected in-field analyses and optimized detector location and response, containment, shock propagation and cratering, and multi-sensor information integration.

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